

## A new species of Dorvilleidae (Annelida: Polychaeta) from a cold seep site in the northeast Pacific

Brigitte Hilbig and Dieter Fiege

(BH) Zoologisches Institut und Museum der Universität Hamburg, Martin-Luther-King-Platz 3,  
20146 Hamburg, Germany;

(DF) Forschungsinstitut Senckenberg, Senckenberganlage 25, 60325 Frankfurt/M., Germany

*Abstract.*—*Parougia oregonensis*, a new species of the Dorvilleidae (Annelida: Polychaeta), is described from 5 specimens collected from a cold seep site at 600–800 m depth in the northeast Pacific at the Cascadia Margin off Oregon. This new species differs from all other species of *Parougia* in the degree of sclerotization of the mandibles, which are anteriorly smooth rather than serrated, and in morphological details of the maxillae. *Parougia oregonensis* is the first member of the Dorvilleidae to be recorded from a cold seep site.

During a joint German-Canadian-U.S. project conducted in summer 1996 to study the cold seep sites along the Aleutian convergence zone, a few days were set apart initially to deploy the Canadian ROPOS (Remotely Operated Platform for Ocean Sciences) at the Cascadia convergent margin off Oregon. In this area, an abundant deep-sea benthic community, dominated by the vestimentiferan tube worm, *Lamellibrachia barhami* Webb, 1969 and the clams, *Calyptogena* sp. and *Solemya* sp. had been observed before at a depth of ca. 2000 m (Suess et al. 1985). Investigations were performed at the Second Accretionary Ridge (=Hydrate Ridge) near ODP-site 892 where gas hydrates and active fluid venting had been shown to occur near the summit of this ridge during ODP leg 146 and cruise 109 of R/V *Sonne* (Herzig et al. 1997). Among the fauna collected were five specimens of a previously undescribed dorvilleid polychaete belonging to the genus *Parougia*. To date, the genus is represented by only six species: *P. caeca* (Webster & Benedict, 1884), *P. furcata* (Hartman, 1953), *P. batia* (Jumars, 1974), *P. eliasoni* (Oug, 1978), *P. nigridentata* (Oug, 1978), and *P. wolffi* Blake & Hilbig, 1990. *Parougia batia*

is reported from deep waters of the northeast Pacific, and *P. wolffi* was described from hydrothermal vents of the Juan de Fuca Ridge, *P. caeca* from the Arctic and *P. furcata* from the Antarctic, while *P. eliasoni* and *P. nigridentata* were described from Norway and Skagerrak, respectively. The new species is the first in this genus to be recorded from cold seep environments.

### Material and Methods

The material was collected during a joint German-Canadian-U.S. cruise with R/V *Sonne* (SO 110 leg 1a, July 1996) to the Second Accretionary Ridge (=Hydrate Ridge) off central Oregon (Suess & Bohrmann 1997). For collecting either a TV-grab (TV-G) or the ROPOS system was used. Drawings were made using a Leitz microscope and Wild dissection microscope. The pharynx was dissected and kept in glycerin over night for better visibility of the jaws. For scanning electron microscopic (SEM) investigations, one specimen was dehydrated via a graded ethanol series, critical point dried using CO<sub>2</sub>, coated with Au-Pd, and examined in a CamScan CS 24 SEM.

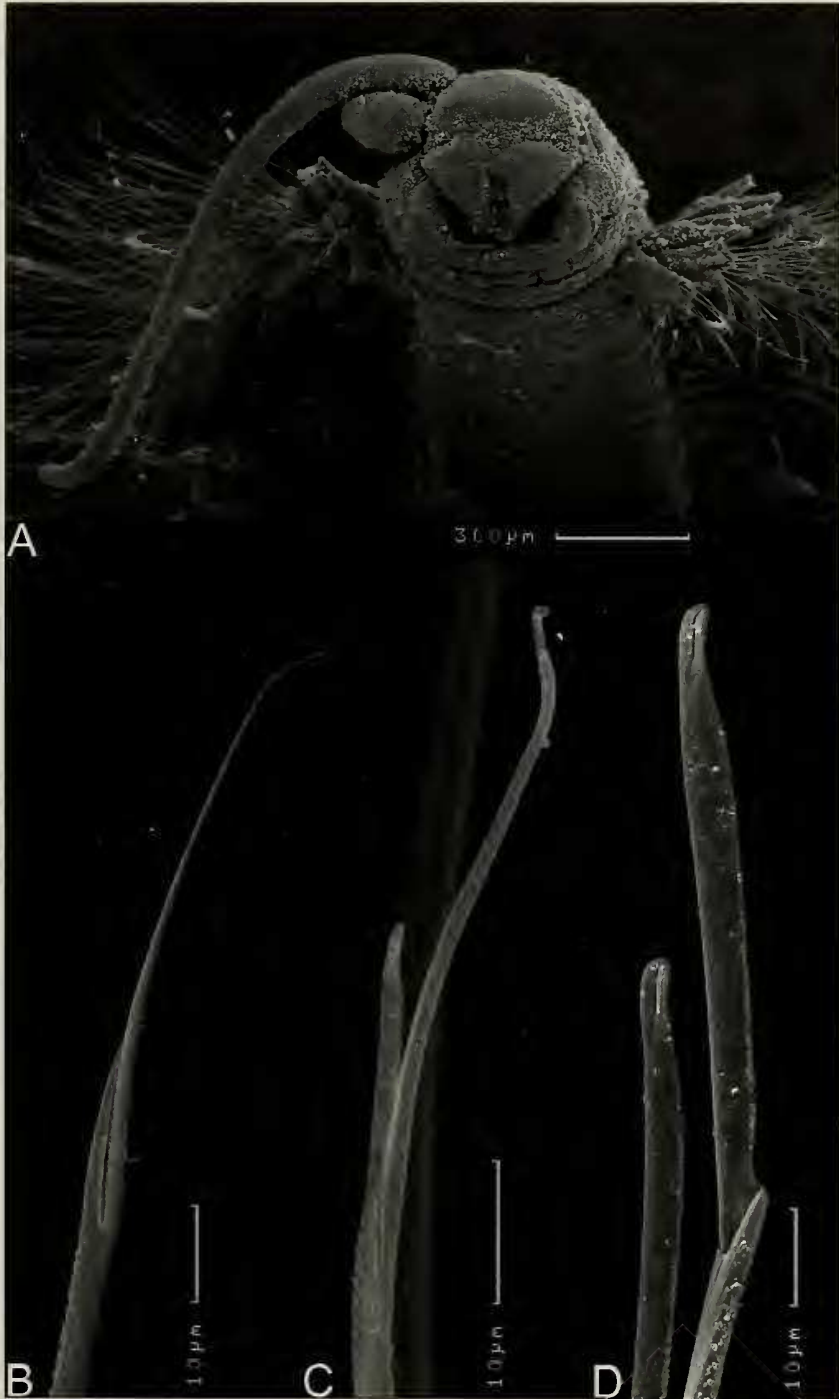


Fig. 1. *Parougia oregonensis*, new species. SEM micrographs of paratype (SMF 8898). A, anterior end, anteroventral view; B, C, furcate chaetae; D, subacicular chaetae.

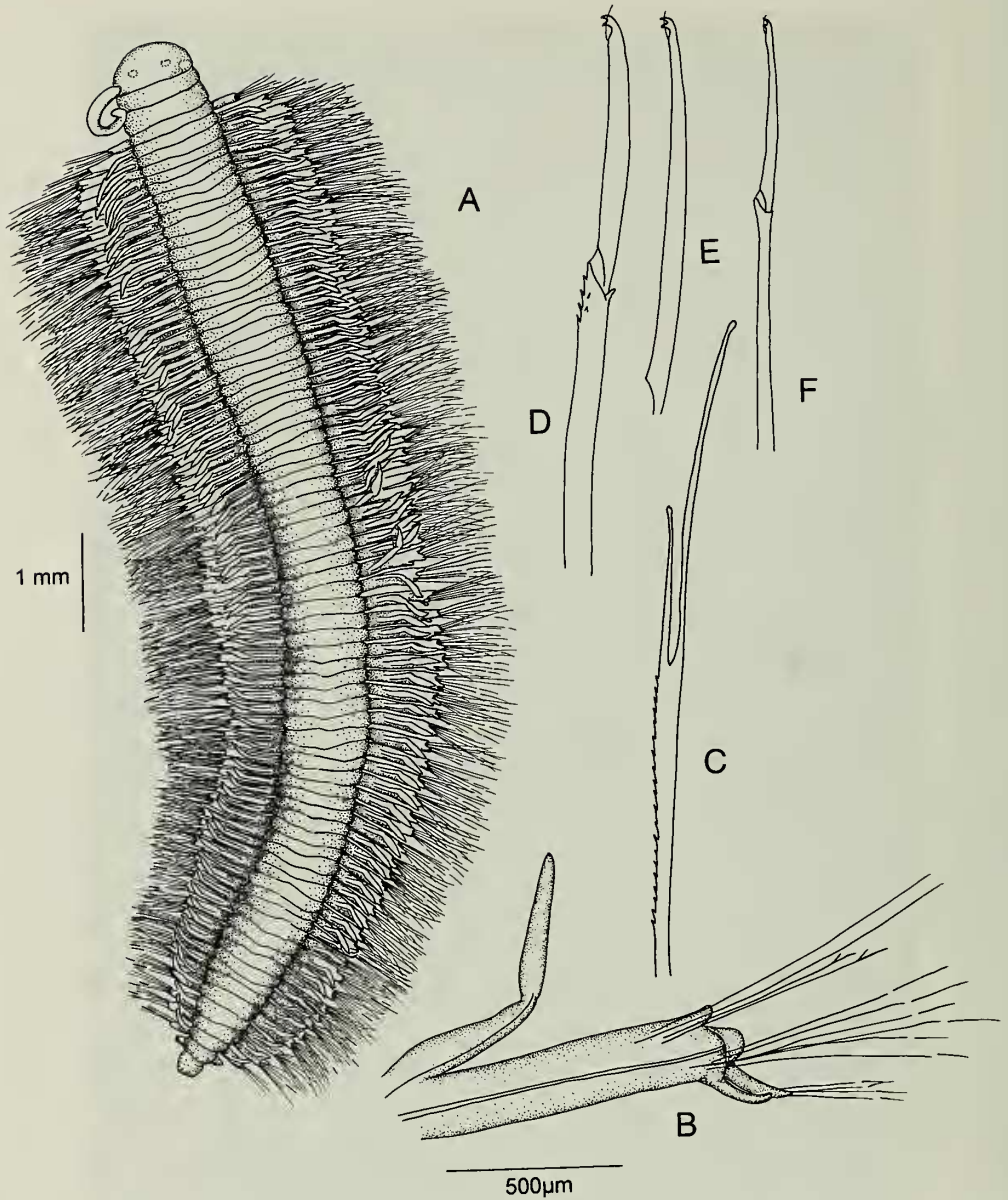


Fig. 2. *Parougia oregonensis*, new species. A, entire animal, paratype (ZIM-P24243), dorsal view; B, parapodium, middle segment, anterior view; C, furcate chaeta; D, E, subacicular, compound chaeta, shortest and longest blades of fascicle; F, small compound chaeta from tip of inferior subacicular lobe. B-C, paratype LACM-AHF Poly 1969; D-F drawn to scale.

Material has been deposited in the collections of the Zoologisches Institut und Museum, Hamburg, (ZIM), Los Angeles County Museum—Allan Hancock Foundation, Los Angeles (LACM-AHF) and the Senckenberg Museum, Frankfurt (SMF).

Family Dorvilleidae Chamberlin, 1919  
 Genus *Parougia* Wolf, 1986  
*Parougia oregonensis*, new species  
 Figs. 1-3

*Material examined*.—NE Pacific, off

Oregon, Cascadia Margin, Second Accretionary Ridge (=Hydrate Ridge): SO 110/1a, ROPOS 339, 10 Jul 1996, 44°40.2'N, 125°6.5'E, 632 m, Pete Vent; holotype (SMF 8897), 1 paratype (ZIM P-23243), 1 paratype (LACM-AHF Poly 1969); SO 110/1a, ROPOS 341 SS 1 (=suction sample 1), 12 Jul 1996, 44°40.12'N, 125°05.80'E, 595 m, northern summit of Hydrate Ridge; 1 paratype + 1 posterior fragment (SEM stub 581, SMF 8898); SO 110/1a, TV-G 18, 13 Jul 1996, 44°34.235'N, 125°08.891'W, 785 m, southern summit of Hydrate Ridge; 1 paratype (SMF 8899).

*Diagnosis.*—Generic definition according to Wolf (1986). Parapodia with suprachaetal, acicular, postchaetal, and inferior chaetal lobes; dorsal cirri with long, tapered cirrophores, about as long as cirrostyles in middle and posterior chaetigers; furcate chaetae numerous, with long serrated subdistal portion and smooth-tipped tines; subacicular chaetae of 2 sizes, those in inferior chaetal lobe much thinner than those of acicular lobe. Mandibles smooth, delicate, winglike; maxillae without inferior basal plates, with superior basal plate and heavily sclerotized superior free denticles and delicate inferior denticles, distal ones with whiplike terminal tooth.

*Description.*—Holotype: length about 17 mm (coiled), width 1.0 mm, excluding parapodia, for about 85 segments; paratypes 5.5 to 12 mm long, 0.7 to 1.5 mm wide, about 47 to 80 segments. Color in alcohol uniformly pale. Prostomium broadly rounded, wider than long, slightly widening toward posterior margin, ventrally forming large, medially incised upper lip (Figs. 1A, 2A). Antennae broken off on most specimens, leaving deep, distinct scars; right antenna on one specimen simple, tapering, about 4 times as long as prostomial width (Fig. 1A). Palps about twice as long as prostomial width, evenly tapered, with short, slightly clavate palpostyle, inserted lateral and slightly anterior to antennal scars; eyes absent. Nuchal organs located at posterior prostomial margin behind antennae; addi-

tional s-shaped ciliary bands running along anterior margin of palps and lateral margin of antennae. Peristomium biannular, anterior ring dorsolaterally split into 2 rings fusing again ventrolaterally and produced ventrally into crenulated lower lip; posterior ring simple, about as long as following chaetigers.

Segments short and crowded throughout, with highly arched dorsum and flat ventrum; ciliary bands restricted to dorso- and ventrolateral areas, continuing onto parapodia and dorsal cirri. Parapodia very long and slender, exceeding segmental width where best developed (Fig. 2A, B). Notopodia present from chaetiger 2, reduced to slender, tapered dorsal cirri supported by delicate acicula in cirrophore; cirrostyle short, pointed in anterior parapodia, increasing to about length of cirrophore (when fully extended) in midbody and posterior parapodia; dorsal cirri subequal in length to neuropodia when relaxed; all parapodial structures with varying proportions due to muscle contraction during fixation. Neuropodia with small digitiform suprachaetal lobe; short truncate acicular lobe; triangular, somewhat longer postchaetal lobe; conical, often retracted inferior chaetal lobe; and subterminal, digitiform ventral cirrus (Fig. 2B). Aciculae and bases of chaetae emerging from inferior chaetal lobe honey colored, other chaetae translucent.

Chaetae long and flowing, most numerous in anterior parapodia; supra-acicular chaetae of 2 types, serrated capillaries and furcate chaetae with long, slender, unequal tines and subdistal serration (Figs. 1B, C, 2C); long tine about 2.0–2.5 times longer than short tine, both with small hood-like structure on tip but not pubescent; subacicular chaetae compound with smooth shafts, distally minutely serrated (visible only with SEM), and bidentate blades of slightly varying length, tips appearing finely serrated in SEM and equipped with sheath by light microscopy (Figs. 1D, 2D, E). Small fascicle of chaetae emerging from

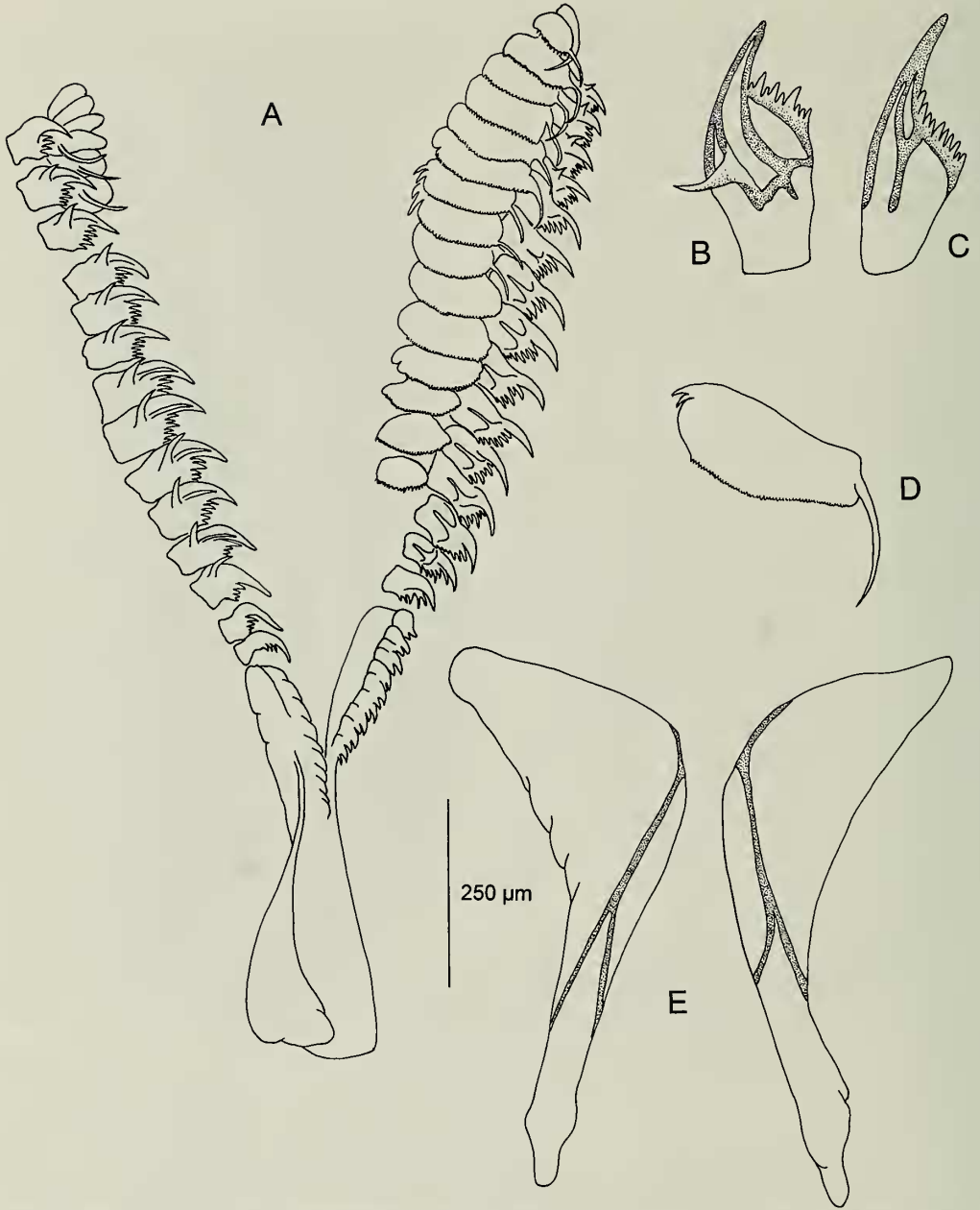


Fig. 3. *Parougia oregonensis*, new species, paratype LACM-AHF Poly 1969. A, maxillae, dorsal view, left inferior denticle row omitted; B, C, superior free denticle, dorsal and ventral view; D, upper inferior free denticle; E, mandibles; A, E drawn to scale.

tip of inferior lobe distinctly thinner and shorter than remaining chaetae (Fig. 2F).

Pygidium ring-shaped, with long, conical ventromedian style and apparently 2 ven-

trolateral anal cirri (all broken off, scars distinct); anus slightly dorsal.

Maxillae consisting of 2 rows of denticles, superior row with basal plates (Fig.

Table 1.—Known species of *Parorgia* and differences in selected diagnostic characters.

Species	Notochaetae	Mandibles, cutting edge	Basal plates	Maxillae	
				Superior free denticles	Inferior free denticles
<i>P. caeca</i> (Webster & Benedict, 1884)	furcates with long unequal tines; occasionally lacking; capillaries serrated	coarse teeth	row of imbricated fused denticles	squarish, with large main tooth and serrated cutting edge	oval, with short, finely serrated cutting edge
<i>P. furcata</i> (Hartman, 1953)	furcates with long unequal tines, short tine pubescent; capillaries serrated	coarse teeth	row of imbricated fused denticles	squarish, with large main tooth and serrated cutting edge	oval, with long, finely serrated cutting edge
<i>P. baia</i> (Jumars, 1974)	furcates absent; capillaries smooth	medially serrated	row of fused denticles	rounded, with main tooth and serrated cutting edge	rounded, with finely serrated cutting edge
<i>P. elitasoni</i> (Oug, 1978)	furcates with long unequal tines, tips pubescent; occasionally lacking; simple setae bidentate	coarse teeth	row of large fused denticles	squarish, with large tooth and serrated cutting edge	rounded, with finely serrated cutting edge
<i>P. nigridentata</i> (Oug, 1978)	furcates with long unequal tines, tips pubescent; capillaries serrated	coarse teeth	row of imbricated fused denticles	elongate, with large main tooth and coarsely serrated cutting edge	oval, with short, finely serrated cutting edge
<i>P. wolfi</i> Blake & Hilbig, 1990	furcates with very short equal tines; capillaries absent	coarse teeth	double row of imbricated fused denticles	elongate, some with whiplike tooth and slanted cutting edge	elongate, some with slanted cutting edge
<i>P. oregonensis</i> , new species	furcates with long unequal tines, tips hooded; capillaries serrated	smooth	row of small fused denticles	squarish, some with heavy accessory dorsal tooth	rounded, with finely serrated cutting edge, some with whiplike tooth

3A). Basal plates relatively short, about one-fourth of total length of superior maxillary row, with toothed edge, about 16 major teeth alternating with very small ones; superior free denticles 14 or 15 on a side, heavily sclerotized oval plates with large main fang and row of alternating small and large teeth along cutting edge and sclerotized ribs across plate, some bearing additional tooth directed upward (Fig. 3B, C). Inferior basal plates absent; free denticles 17 or 18 on a side, all broadly rounded, delicate plates with very finely serrated cutting edge, from D6 on additional long, whiplike marginal tooth (Fig. 3D). Mandibles wing-shaped, with slightly divergent sclerotized handles and smooth cutting edge; wing-like anterior part of mandible with sclerotized rib between tip of handle and anterior margin (Fig. 3E).

*Remarks.*—Most dorvilleids described from deep water in general, and geologically active sites in particular, belong to either *Ophryotrocha* or *Exallopus* (for example, Blake & Hilbig 1990, Hilbig & Blake 1991). Species of *Parougia* reported from deep waters of the northeast Pacific are *P. batia* (Jumars, 1974), *P. caeca* (Webster & Benedict, 1884) and *P. wolfi* Blake & Hilbig, 1990, the latter being the only dorvilleid from the *Dorvillea-Ougia-Parougia* group so far described from geologically active environments, i.e., hydrothermal vent systems. *Parougia oregonensis*, new species, differs from *P. wolfi* most obviously in the presence of long-tined furcate chaetae and distally entire rather than bidentate capillaries. Furthermore, *P. oregonensis* has mandibles with a smooth rather than serrated cutting edge, and there are large differences in the shape and degree of sclerotization of the free denticles. This difference can be easily seen by examining the maxillae in situ through a middorsal incision of the anterior thorax without further dissection. *Parougia batia* is much smaller than *P. oregonensis* and has no furcate

chaetae, and the maxillary denticles are delicate and few in number; *P. caeca* lacks suprachaetal parapodial lobes and has a strongly sclerotized mandible with serrated cutting edge. All other species of the genus *Parougia* also differ from *P. oregonensis* in the heavily sclerotized, anteriorly serrated mandibles and in morphological details of the maxillae. A synopsis of some important morphological characters among species of *Parougia* is given in Table 1.

*Etymology.*—The species is named after its type locality off Oregon.

*Distribution.*—Known only from cold seeps off Oregon, about 600–800 m depth.

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